

## Southeast Regional Assessment Project (SERAP)

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**Overview:** The Southeastern United States spans a broad range of physiographic settings and maintains exceptionally high levels of faunal diversity. Unfortunately, many of these ecosystems are increasingly under threat due to rapid human development, and management agencies are increasingly aware of the potential effects that climate change will have on these ecosystems. Natural resource managers and conservation planners can be effective at preserving ecosystems in the face of these stressors only if they can adapt current conservation efforts to increase the overall resilience of the system. Climate change, in particular, challenges many of the basic assumptions used by conservation planners and managers. Previous conservation planning efforts identified and prioritized areas for conservation based on the current environmental conditions, such as habitat quality, and assumed that conditions in conservation lands would be largely controlled by management actions (including no action). Climate change, however, will likely alter important system drivers (temperature, precipitation, and sea-level rise) and make it difficult, if not impossible, to maintain recent historic conditions in conservation lands into the future. Climate change will also influence the future conservation potential of non-conservation lands, further complicating conservation planning. Therefore, there is a need to develop and adapt effective conservation strategies to cope with the effects of climate and landscape change on future environmental conditions.

**Project Goal:** SERAP seeks to formally integrate multidisciplinary project components to aid conservation planning and design so that ecosystem management decisions can be optimized for providing desirable outcomes across a range of species and environments. SERAP will provide a suite of regional climate, watershed, and landscape-change analyses and develop the interdisciplinary framework required for the biological planning phases of adaptive management and strategic conservation. There are 4 main SERAP components:

- Developing Regionally Downscaled Probabilistic Climate Change Projections;
- Integrated Coastal Assessment;
- Integrated Terrestrial Assessment; and
- Multi-Resolution Assessment of Potential Climate Change Effects on Biological Resources: Aquatic and Hydrologic Dynamics,

These components produce data and other outputs that are compiled and used in the development of a fifth component:

- Optimal Conservation Strategies to Cope with Climate Change, a tool for resource managers to ensure the most effective land management strategies.

**Deliverables:** The following sections outline the products that have been or will be produced by the SERAP.

1. *Developing Regionally Downscaled Probabilistic Climate Change Projections* – Statistically downscaled projections of maximum and minimum temperature and mean precipitation through 2099 at 12-kilometer grids for the conterminous US. A select series of derivative data will be produced from model outputs, including, but not limited to potential evapotranspiration, solar radiation, fire frequency, and frost days.
2. *Integrated Coastal Assessment* – Products include predictive maps of shoreline erosion, data collected from 6 sediment elevation table (SET's) sites (24 total installations) located in Mississippi and Alabama, and maps of predicted inundation resulting from sea-level rise (available on the web at <http://gom.usgs.gov/slr/index.html>).
3. *Integrated Terrestrial Assessment* – Products include urban growth projections for 2010 – 2100 at 60-meter grids, vegetation state and transition models at 30 meter grids for each vegetation class in the Southeast with downscaled climate data incorporated as a fire multiplier (A1Fi, B1 scenarios), gridded output of suitable habitat, by species, for 606 terrestrial vertebrates that occur in the Southeast through 2100 for three climate scenarios (A2, A1B and B1) based on non-downscaled climate data, and land-cover maps for 1992, 2001, and 2006.
4. *Multi-Resolution Assessment of Potential Climate Change Effects on Biological Resources: Aquatic and Hydrologic Dynamics* – Products available include predicted streamflow variables, hydrologic cycle components, and simulation of instream temperature fluctuations throughout the Apalachicola-Chattahoochee-Flint (ACF) River basin; as well as updated geomorphic characterization, stream-channel classification, and updated depression storage and vegetation coverages for the ACF River basin.

Species-response models will be used to predict the presence or absence of aquatic species in stream segments, for both coarse and fine resolution models, as a result of changing climate conditions

5. *Optimal conservation strategies to cope with climate change* – The final product will be an optimal conservation-strategies model based on identified management and policy alternatives that are most likely to sustain populations of focal species. The model will identify key elements for monitoring to reduce uncertainty regarding the effect of climate change on terrestrial and aquatic populations and their habitats and measure progress toward population and habitat objectives.

All project output will be maintained and readily available on a publically available data portal. The Data Portal was originally conceived as a mechanism to help SERAP team members easily share data and output, but has since been adopted by CSCs nationwide as a preferred data-management tool known as the GeoData Portal.

**Timeline:** The multifaceted nature of this project ensures that each component will have a different timeline, with start and end points intersecting throughout the life of the project. SERAP was initially funded through FY11, although some components of the work are not technically planned for completion until FY13, namely Optimal Conservation Strategies to Cope with Climate Change. Many components of the work plan however are complete and the resulting data sets can be accessed from the GeoData Portal.